

EXPLANATION OF PLATE XVI.

- Fig. 1.* *Rotalia spiculotesta*, n. sp. Natural size.
Fig. 2. The same, magnified throughout on the scale of 1-24th to 1-1800th inch. *a*, chamber broken open, showing the spicular composition and thin structure of the wall; *b*, cavity of the chamber, showing the spicular structure of the wall from the interior; *c*, dried and contracted sarcodæ of the animal.
Fig. 3. The same, diagram; portion of the wall of a chamber, magnified upon the scale of 1-12th to 1-1800th inch, to show the form of the spicules and areolated calcareous cement. *a*, spicules separate; *b*, spicules crossing each other; *c*, areolated cement.

LIX.—*Descriptions of new Species of Heterocera from Japan.*
 —Part I. *Sphinges and Bombyces.* By ARTHUR G. BUTLER,
 F.L.S., F.Z.S., &c.

[Continued from p. 404.]

Notodontidæ.

33. *Phalera signata*, n. sp.

Primaries above white, irrorated with black, brown, and yellow; a patch of raised white scales closing the cell, and followed by a lunulated oblique brown line from costa to inner margin; a discal irregular series of brown-edged, embossed, white lunate spots, followed by an indistinct greyish belt; a series of black Σ -shaped markings along the outer margin; secondaries fuliginous brown, becoming darker externally and ochraceous or testaceous at abdominal margin; thorax white, mottled with blackish scales; abdomen testaceous, with the anal segments whitish; antennæ ferruginous, with testaceous pencil-like pectinations: wings below of the male testaceous, clouded with brown, body testaceous; female rather sandy yellow than testaceous. Expanse, ♂ 2 inches 5 lines, ♀ 2 inches 11 lines.

♂, Yokohama (*Jonas*); ♀, Hakodaté (*Whitely*).

This species has the aspect of *Dasychira*, but the structure of *Phalera*.

34. *Bireta pallida*, n. sp.

♂ ♀. Primaries pale straw-yellow, with a large, pale brownish internal patch, reaching to the first median branch, and a longitudinal streak of the same colour through the end of the cell; an oblique rounded spot of the ground-colour on the lower discocellular; an oblique sinuated line (angulated

near the costa) crossing the wing just beyond the middle, and followed below the third median branch by a straight oblique line; an oblique apical dash; a submarginal series of very minute brown dots: secondaries whitish, clouded with pale brown; thorax white, brownish in front, with a central trigonate, scutiform, testaceous patch; body testaceous, anal segments whitish; antennæ with tawny pencils; underside creamy white, the primaries clouded with brown. Expanse, ♂ 1 inch 11 lines, ♀ 2 inches.

♂, Yokohama (*Jonas*); ♀, Japan (*Pryer*).

The markings on the primaries of the male are indistinct. The genus *Bireta* is closely allied to *Ceira*.

35. *Cerura lanigera*, n. sp.

Nearly allied to *C. furcula*, but the discal area of primaries clouded with grey, the central band blackish, constricted in the middle, its inner edge being angulated; the ochreous scales replaced by a few scattered stramineous scales; the outer discal lunate line replaced by well-defined blackish lunate spots; external area (excepting the outer margin) greyish in all the wings: body whiter, with blacker abdominal bands. Underside of wings considerably darker. Expanse 2 inches.

Hakodaté (*Whitely*).

36. *Dicranura felina*, n. sp.

Intermediate in character between *D. erminia* and *D. vinula*; primaries most like those of *D. vinula*, but differing from both species in that the outermost discal line is much more deeply waved, and from *D. erminia* in the deeper waving of both discal lines; the innermost (or third discal) line of *D. vinula* does not extend in this species beyond the first median branch: secondaries white as in *D. erminia*, but with a well-defined, blackish, discocellular lunule: body almost as in *D. vinula*. Expanse, ♂ 2 inches 5 lines, ♀ 2 inches 8 lines.

Yokohama (*Jonas*).

37. *Peridia gigantea*, n. sp.

Nearest to *P. trepida*, but with a broader internal projecting scale-patch than in any other species; above greyish brown: primaries with a broad, subquadrate, subcentral, whitish patch from the costa to the median vein, where it becomes more distinctly testaceous, and is continued as an ill-defined streak below the first branch for half its length and terminates in a

<-shaped marking; orbicular and reniform spots represented by 8-shaped markings, and forming part of the subquadrate patch; basal area to submedian vein crossed by a testaceous streak, intersected and bounded externally by zigzag dusky lines; an oblique whitish costal spot beyond the cell, followed across the disk by whitish dots on the nervures; two or three indistinct subapical whitish lunules running obliquely between the veins; secondaries whitish, with a very broad greyish external border, a central greyish line parallel to the border, apex and one or two subapical spots whitish; tegulæ bordered with black; a black annulus on metathorax; abdomen brown: below sandy whitish; secondaries with two indistinct central parallel greyish lines. Expanse 2 inches 7 lines.

Yokohama (*Jonas*).

HUPODONTA, nov. gen.

Allied to *Notodonta* and *Pheosia*, but with broader primaries, having no internal tooth; antennæ broadly pectinated throughout; the scape densely clothed with scales, conical: secondaries densely scaled. Type *H. corticalis*.

38. *Hupodonta corticalis*, n. sp.

General aspect of *Notodonta ziczac*; primaries pale brown, clouded and streaked with darker brown, two pale dashes in a dusky semicircular patch just beyond the cell; costa black, spotted in the centre and towards apex; a cuneiform black internal dash; disk crossed by a grey zigzag line dotted with black on the nervures; outer border first dark brown, followed by a sinuated whitish line, then lilacine, intersected by a submarginal series of black 3-shaped markings, and edged with black; fringe pale brown, with darker external edge; secondaries grey, crossed by pale streaks and lines, which are most distinct near outer margin and edged with dark brown towards anal angle; body pale brown, tegulæ darker; collar and head dark brown, bordered with whitish: primaries below greyish brown, with the interno-median area and outer border paler; secondaries whity brown, crossed by an arched dusky belt, and with basicostal and anal dusky dashes; pectus greyish brown, venter pale brown. Expanse 2 inches.

Yokohama (*Jonas*).

GONOCLOSTERA, nov. gen.

Aspect of *Closteromorpha* of Felder (Nov. Lep. pl. lxxxiii.), but the antennæ broadly pectinated throughout, the primaries less distinctly angulated externally; palpi short and broad,

with very minute terminal joint; tibiæ clothed with long hair. This genus should be placed near to *Derrioides*. Type *G. latipennis*.

39. *Gonoclostera latipennis*, n. sp.

Primaries greyish brown, crossed by two diverging lines, the inner one slightly arched, the outer slightly sinuous, a broad triangular patch (enclosed by these lines) becoming gradually darker towards the centre of the wing, apical area dusky; secondaries paler brown, the costal area very light; an indication of a light, discal, transverse, arched line; thorax dark brown, abdomen slightly paler: under surface altogether paler, with two parallel, central, dusky, transverse lines; primaries with the base and a costal spot near apex whitish; secondaries and margins of venter whity brown. Expanse 1 inch 4 lines.

Yokohama (*Jonas*).

GELASTOCERA, nov. gen.

Aspect of *Cleapa*, to which it seems allied, but the antennæ broadly pectinated for rather more than half their length with long bristle-like pectinations; apical two fifths covered with an extremely short pilosity (only visible with a lens); palpi projecting some little distance in front of the head; abdomen very slender. Type *G. exusta*.

40. *Gelastocera exusta*, n. sp.

Primaries ferruginous, with a broad central piceous band, widest on inner margin; external area sordid testaceous; secondaries whitish, slightly ferruginous at outer margin; head and thorax reddish, antennæ brown, abdomen whitish: under surface whitish, with a few scattered ferruginous scales; centre of primaries greyish. Expanse 1 inch 3 lines.

Hakodaté (*Whitely*).

The antennæ are most like those of the genus *Thiacidas*.

LIMACODIDÆ.

PHRIXOLEPIA, nov. gen.

Allied to *Natada*; the wings short and broad; primaries with the inner margin incurved at the base; thorax short, clothed with upright bristling scales; antennæ thickened towards the base, but without pectinations. Type *P. sericea*.

41. *Phrixolepia sericea*, n. sp.

Primaries shining ferruginous or cupreous brown, crossed

obliquely by an angulated white line, which, towards the inner margin, is bounded internally by deeper colour and externally by grey; costal margin yellow, fringe white; secondaries shining brown, fringe white; thorax chocolate-brown; abdomen greyish, with yellow anal tuft: under surface shining whitish brown; primaries slightly greyish with yellowish costa. Expanse 1 inch 1 line.

Yokohama (*Jonas*).

Drepanulidæ.

42. *Oreta turpis*, n. sp.

♂. Pale shining brown, external area sprinkled with short black lituræ; fringe dark chocolate-brown: primaries crossed obliquely by two contiguous, parallel, discal, greyish lines, which become blackish towards the apex; a short plumbeous apical streak between the outer line and the margin; the costa at apex and the fringe in the subapical sinus black; secondaries with the costal area pale, apical area rather darker than the rest of the wing; thorax reddish brown; abdomen pale brown, anal tuft yellowish: under surface testaceous, speckled sparsely with grey; fringe brown. Expanse 1 inch 4 lines.

Yokohama (*Jonas*).

43. *Oreta calida*, n. sp.

Laky brown, mottled with black lituræ; the male less red than the female; wings crossed by two central blackish lines, the inner one slightly incurved, and the outer one angulated near the costa of primaries, bounded also by a yellow line running to the apex, and limited externally by a brown streak; apex greyish, with black margin; fringe dark brown; extremity of the cell more or less dusky: secondaries with dark brown fringe; the female with a discal series of black dots, outer border ferruginous. Under surface bright reddish tawny, spotted with grey, and crossed by a discal grey stripe, which is angulated near the costa of primaries; legs red. Expanse, ♂ 1 inch 8 lines, ♀ 2 inches.

Yokohama (*Jonas*), Hakodaté (*Whitely*).

Allied to the preceding species and to *O. suffusa*.

44. *Oreta pulchripes*, n. sp.

Sordid testaceous; wings bordered and clouded with rosy lilacine, and margined with ferruginous, mottled and striated with grey; primaries with two or three costal spots and one near the external angle blackish, crossed by two oblique irre-

gular grey lines, the inner one zigzag, the outer undulated, both angulated near the costa, the outer one bordered externally by a bright yellow line, terminating in an ochraceous patch near the apex; a large ferruginous spot at the end of the cell, enclosing a plumbaginous >-shaped marking; head bright yellow; palpi, frons, and anterior coxæ scarlet; collar greyish, more or less lilacine; abdomen yellow, brightest in the male: under surface cadmium-yellow, densely irrorated with red; primaries mottled with grey, and with a grey submarginal streak; secondaries with a central red streak; legs clothed with scarlet hair. Expanse 1 inch 6-7 lines.

Yokohama (*Jonas*).

45. *Oreta calceolaria*, n. sp.

Sulphur-yellow; wings with central band, basal area, external border of primaries, and a few scales at apex of secondaries reddish brown, mottled with grey and shot with lilacine; palpi and frons plum-coloured; vertex of head and antennæ gravel-yellow; collar lilacine; thorax sordid ochraceous; abdomen testaceous: wings below sulphur-yellow, basal area broadly cadmium-yellow netted with scarlet; primaries with external border red, greyish towards the apex: body stramineous; legs yellow, streaked above with scarlet; anterior coxæ scarlet. Expanse 1 inch 7 lines.

Yokohama (*Jonas*).

Nearly allied to *O. rosea* from Nova Scotia, but much larger and duller in colouring, the central band moreover being of more equal width throughout. It is just possible that the type of *Drepanulides* (?) *rufulus* of Motschulsky may be a rubbed and faded specimen of this species; but it is impossible to tell without seeing it.

46. *Drepana scabiosa*, n. sp.

Above pearly grey: primaries with the costal margin golden orange; a submarginal dark grey stripe; fringe greyish brown; an angulated central transverse series of squamose brown spots, surrounded by sordid white zones: secondaries with a similar spot at the end of the cell, two or three scarcely perceptible parallel discal greyish lines; fringe brown; collar golden orange. Under surface pale stramineous, rather brighter towards apex of primaries; fringe grey. Expanse 1 inch 5 lines.

Yokohama (*Jonas*).

HYPSOMADIUS, nov. gen.

Allied to *Drepana*, but more robust, the head not visible

from above; palpi extremely short; the antennæ compressed, the joints imbricated; shoulders square, in a line with the costal margin of primaries: primaries trigonate, produced at apex, outer margin slightly concave; secondaries subtrigonate, the costal margin straight, abdominal margin slightly concave, anal angle produced, outer margin convex; legs clothed with long hair to the end of the tarsi. Type *H. insignis*.

47. *Hypsomadius insignis*, n. sp.

Wings above shining silver-grey, crossed by two lines, the inner one of primaries and the outer one of secondaries irregularly dentate-sinuate, these and the inner one of secondaries testaceous: primaries with the outer line oblique, running to apex, dark red; apical area above the line irrorated with black; fringe dark red; costal margin ochreous: secondaries with the fringe testaceous: body grey, prothorax white, sides of abdomen and anus rosy; head orange, with four lateral patches of crimson scales; legs below whitish; femora whitish above; tibiæ yellow, with a black central spot above, rose-coloured at the sides, the whole of the joints clothed on each side with a long fringe of bright rose-coloured hair, venter crimson. Wings below shining rose-coloured, crossed by innumerable grey lituræ, most densely in the primaries, the latter wings with a grey indistinct oblique line running to the apex; costal margin, apex, fringe, and veins near apex yellow. Expanse 2 inches.

Yokohama (*Jonas*).

Saturniidæ.

48. *Caligula japonica*, Moore.

The pupa of this species, but not the imago, has been described by Mr. Moore. It is nearly allied to *C. simla*, but may at once be distinguished by the inner transverse stripe on both wings, which in the primaries is nearly straight (slightly concave), instead of 3-shaped, and in the secondaries angularly sigmoidal, instead of being regularly convex with an abrupt angle near the abdominal margin. Expanse, ♂ 5 inches 2 lines, ♀ 5 inches 1–5 lines.

Yokohama (*Jonas*).

49. *Caligula Jonasii*, n. sp.

♂. Primaries with whitish costal margin; interno-basal area, limited by an angulated dark red-brown stripe, dull red; discoidal and subcostal areas, and a band immediately beyond the subbasal stripe, and bounded externally by a second simi-

lar one, pink ; a large black-bordered dull red ocellus enclosing a black spot, its inner third being occupied by red, white, and testaceous lines, at the end of the cell ; discal area dull yellowish brown ; two apical converging black spots with white and rose-coloured continuations ; a broad sinuated submarginal band, angulated and white-edged at external angle ; margin yellowish grey ; fringe grey, with a pale brown central line : secondaries with the basal two thirds sordid pink, crossed by two central angulated grey stripes, and bounded externally by a third broader one ; disk and border as in primaries, but the submarginal band with a continuous white internal edge ; an ocellus as in primaries at the end of the cell : head and thorax dark dull red ; antennæ testaceous ; collar grey with a brown border, abdomen clay-coloured. Wings below with the basal three fourths sordid pink, clouded with pale testaceous, with a central brown stripe ; a double zigzag continuous discal line bounding the externo-discal area, which is nearly as above ; ocelli almost as above : body below reddish clay-colour ; legs and palpi dark dull red. Expanse 3 inches 10 lines.

Yokohama (*Jonas*).

50. *Rhodia fugax*, n. sp.

♂. Allied to *R. newara*, but much smaller, the primaries less falcate ; the transverse bands better-defined, greyer, more dentated ; the hyaline spots of primaries twice as large, those of secondaries only half as large, the rosy tints replaced by burnt sienna, which colour more or less suffuses the whole external area of the secondaries ; the antennæ much darker. Expanse 4 inches 3-4 lines.

Yokohama (*Jonas*).

51. *Tropœa gnoma*, n. sp.

Allied to *T. artemis*, but smaller, of a bluer green ; the veins brown instead of white ; the fringe whitish, and the tails of secondaries much narrower, longer, and more divergent. Expanse 3 inches 9 lines.

Yokohama (*Jonas*).

Lasiocampidæ.

52. *Trabala cristata*, n. sp.

Nearly allied to *T. niveiceps*, but altogether more ochraceous, the primaries crossed by two pale brown stripes which diverge towards the costa, the inner one at the basal third, and the outer one at the middle of the wing ; a nearly straight

transverse dark red-brown discal line; two ochre-bordered cream-coloured spots at the end of the cell; crest (formed by the conjunction of the tegulæ) considerably higher and distinctly bordered with yellowish clay-colour; head, collar, ventral surface of the body and secondaries below cream-colour instead of white. Expanse 3 inches 8 lines.

Yokohama (*Jonas*).

53. *Odonestis excellens*, n. sp.

♂. Primaries deep sordid ochreous or gravel-yellow, with a white spot at the end of the cell, outer border broadly and irregularly chocolate-brown; base brownish, enclosing a large subcostal spot of the ground-colour; three equidistant zigzag lunulated brown stripes, the area between the first two brownish; secondaries chocolate-brown, with a central diffused darker band: body deep sordid ochreous; antennæ cream-coloured, with brown pectinations: wings below ochraceous, with three subparallel transverse brown streaks, the two outer ones on the secondaries macular. Female sordid testaceous, with markings as in the male, but far less distinct. Expanse, ♂ 2 inches 10 lines, ♀ 3 inches 6 lines.

Yokohama (*Jonas*).

Allied to *O. sodalis* from China and "*Lebeda*" undans from Silhet.

54. *Odonestis superans*, n. sp.

Smoky brown, with a white spot at the end of the cell; primaries with an irregularly sinuous disco-submarginal whitish-bordered dusky stripe, a slender transverse broadly sinuated discal line; male rather paler than the female, the primaries with a large white subcostal spot near the base, an angulated transverse subbasal line, the centre of interno-median area occupied by a broad white nebula: wings below uniform in colouring, with an indication of a diffused darker discal streak across both wings. Expanse, ♂ 3 inches 3 lines, ♀ 4 inches 3 lines.

Yokohama (*Jonas*).

55. *Odonestis spectabilis*.

♀. Like the preceding, excepting that the primaries and thorax are black, and the whitish border of the disco-submarginal stripe is replaced by white spots; no white spot at the end of the cell; the under surface with dusky-streaked external area to primaries and black prothorax; ground-colour of the wings redder. Expanse 4 inches.

Yokohama (*Jonas*).

The costal margin of this species is more arched than in *O. superans*.

56. *Eona segregata*, n. sp.

Primaries black, speckled all over with white scales, most noticeably in the female; two central parallel dentate-sinuate oblique white bands, angulated towards costa; a subbasal nebula and a **W**-shaped series of disco-submarginal spots, reddish and diffused in the male, white in the female: secondaries dark brown, with paler diffused central band and outer border: thorax black, margins of collar and tegulae grey; abdomen reddish brown; antennae white, with red-brown pectinations. Underside pale reddish brown; costal margins blackish: primaries with a subcostal diffused white streak near the apex; an indistinct central transverse dusky streak; eight discal spots and the fringe blackish: secondaries crossed from the middle by three broad dusky belts; costa and external border whitish. Expanse, ♂ 2 inches 7 lines, ♀ 3 inches 4 lines.

Yokohama (*Jonas*).

Allied to "*Lebeda*" *hebes*.

Cossidæ.

57. *Hepialus excrescens*, n. sp.

♂. Primaries above pale pinky brownish, reticulated with grey, and sparsely speckled with black; costa with a post-median convex excrescence; margin black-spotted; basal half of the wing, excepting the costal and internal areas, occupied by a large triangular yellowish brown patch, its inferior border edged with whitish; an ill-defined subangulated yellowish-brown discal band; secondaries grey, with the costal and outer margins brown, a black subapical costal spot; body brown: under surface shining brown, costa of primaries spotted with sordid white and blackish. Expanse 2 inches 8 lines.

Yokohama (*Jonas*).

Allied to *H. quadriguttatus* of Grote.

58. *Hepialus æmulus*, n. sp.

♂. Nearly allied to the preceding, but the primaries paler, brownish testaceous, with the external and internal areas and a transverse belt beyond the cell shining silvery greyish; two olivaceous spots in the cell and one below it; secondaries blackish, the external border and apical portion of costa pale with brassy reflections; thorax whitish, with brown borders;

abdomen greyish brown : under surface of wings brown, costal margins whitish, spotted with brown ; pectus dark brown, legs paler ; venter whitish brown ; an ochreous tuft on each side at the base. Expanse 3 inches.

Yokohama (*Jonas*).

LX.—*The Post-tertiary Beds of Grinnell Land and North Greenland.* By H. W. FEILDEN, F.G.S., C.M.Z.S., Naturalist to the late Arctic Expedition ; and *Note* by J. GWYN JEFFREYS, LL.D., F.R.S.

In a paper written by Dr. Gwyn Jeffreys, and read at the Plymouth Meeting of the British Association, 20th Aug., 1877, and subsequently printed*, the author directs attention to the Post-tertiary fossils procured in the late Arctic Expedition. My intention now is to supplement that paper by the addition of a few species of Mollusca which had not been submitted to Dr. Gwyn Jeffreys when he published his list, and to add a little information in regard to the structure and extent of these recent deposits, with a notice of the Mammalian and other remains discovered in them.

The localities whence the fossil Mollusca examined by Dr. Gwyn Jeffreys were brought are recorded in his paper, and are numbered by him stations 1 to 12. Nos. 1 and 9 of his list embrace various localities in the vicinity of Floeberg Beach, the winter quarters of H.M.S. 'Alert,' lat. 82° 27' N., long 61° 42' W. This list of stations by no means exhausts the whole area over which the Post-tertiary deposits are spread, and from which the collections made by members of the expedition were derived ; for at nearly every point visited in Smith Sound and northwards, either on the Grinnell-Land or Greenland shores, where the snow-covering was wanting, evidences of recent elevation were traced.

This elevation of the land in the northern circumpolar regions has long since been brought to the notice of geographers and geologists ; and the subject has been treated in a very able and comprehensive manner by Mr. Henry H. Howorth†. The conclusion arrived at by that author is fully confirmed by our observations made in Grinnell Land and North Greenland, which substantiate his opinion that the land which "surrounds the North Pole is undergoing a general

* Ann. & Mag. Nat. Hist. Sept. 1877, pp. 229-242.

† Journ. Roy. Geogr. Soc. 1873.